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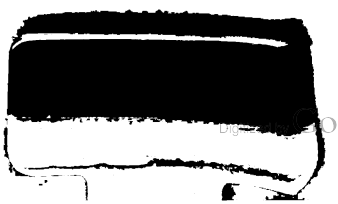
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# THE MYSTERY OF MATTER

*AND OTHER ESSAYS.*

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# THE MYSTERY OF MATTER

## *AND OTHER ESSAYS.*

BY

JAMES ALLANSON PICTON,

AUTHOR OF "NEW THEORIES AND THE OLD FAITH."

*CHEAPER ISSUE, WITH A NEW PREFACE.*

London:

MACMILLAN AND CO.

1878.

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## PREFACE TO THE CHEAPER ISSUE.

THE five years that have elapsed since the first publication of the following essays have given many indications of the rapid increase of that mood of mind to which it was thought they might possibly give a little help. This mood is not one of irreverence or of unsusceptibility to spiritual inspirations. It is rather a painful sense of incongruity between the alleged history of revelation and the actual facts of universal evolution, which, fragmentary though our knowledge be, do more and more impress upon us the conviction that they are "parts and proportions of one wondrous whole." There is no such schism between religion and intellect as that which characterized the last century. On the contrary, side by side with a growing independence of traditional creeds, there is a more marked tendency than the

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world has ever known before to associate the emotions of religion with the discoveries of science. To those whose only notion of alliance between religion and science consists in the futile compromise of a "Bridgewater Treatise" this may appear a bold assertion. But those to whom the most obvious emotion of religion is reverential awe, and its chief fruits self-subordination, uncompromising truth, and charity, will gladly allow that science, as represented by its most distinguished masters, is increasingly affected by the inspirations of the spiritual life.

This spirit, too, descends upon the undistinguished crowds whose eyes are opened by the teaching of these masters to the actual order of the world. In the columns of many periodicals, circulating mainly amongst religious circles, there is unmistakable proof that the two movements mentioned above show themselves, with more or less force, in almost all sects alike. The letters from correspondents reveal a prodigious ferment going on in the minds of a class who twenty-five years ago were, in regard to religious opinion, as placid and clear as one of Professor Tyndall's solutions in the germless Alpine air. But some unlooked-for breeze

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has disturbed their serenity. It has borne amongst them the germs floating in another atmosphere, and the inevitable process has begun. Yet this also is to be noted, that very rarely indeed is there any symptom of scornful scepticism. These people are not less religious, but much more so than when their cosmogony was that of Moses, and their vista of human development was blocked by the deluge. Their consciousness of God is not diminished, but enlarged. They find Him where once they sought Him not. Like Jacob, they see in common skies an angels' ladder, and in a mountain boulder an altar of the Eternal.

But this new wine of a more spiritual religion cannot be kept in the old bottles manufactured by the early church councils. Sad rents in one and another definition create alarm for all the rest. And many, like the Sanhedrim of old, "wonder whereunto this will grow." That question cannot be answered, as some would have it, by drawing a hard and fast line at some minimum of metaphysical creed. What we want is, some method of interpreting the signs of the times which will open our eyes to what is in truth not

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an eclipse of faith, but a larger revelation. These essays were intended as a contribution towards such a method; and though the writer feels their imperfections even more deeply than when they were first published, he is led to believe that amongst the class described above, there are here and there those by whom the present issue is desired.

OPPIDANS ROAD, N.W.,
*March, 1878.*

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# PREFACE.

WHEN a gradual landslip occurs on a great scale, the inhabitants of the neighbourhood are naturally anxious to know how far the movement may possibly extend, and what is likely to be the level of ultimate settlement. So, at the present day, when faith's centre of gravity is slowly but surely moving away from tradition and authority to some position of more stable equilibrium, all of us, when not rendered absolutely incoherent by alarm, have a reasonable wish to forecast the final result, or, at all events, to be assured of some limits beyond which the movement cannot extend. Of course, there can be no finality in opinion or knowledge. For even ascertained facts are always showing fresh aspects, or unfolding new meanings. But the question raised by the religious landslip of

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our time is not—or ought not to be—at what sacred opinions will the movement stop? It rather asks,—are there any fundamentally constituent elements in human nature which must for ever necessitate religion? And farther,—is there, in the relation of our personal life to the world about us, anything which ensures to religion an adequate scope and a permanent place, under all fairly conceivable revolutions of thought? The former question was the main topic of a previous volume. The latter question, the larger and the more comprehensive, is dealt with in the following pages.

Such an enterprize, unless when undertaken by some recognized leader of thought, might seem self-condemned by its presumptuous ambition; were it not for two or three considerations, which may be urged in arrest of judgment. In the first place, no one expects at present either to receive or to give to such questions an answer which shall be final and exhaustive. And next, the matters at issue seem to be just at that point where the freest inter-communication of thought by the most ordinary men, if only they have a single eye to truth, appears pre-eminently desirable. After much agitation, some master mind may at length

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arise, who, if he cannot control destiny, will, at all events, make peace between the past and the future. And again, if in our passage so far through the world, any one of us finds some conclusion burnt into him by a fire he has vainly sought to quench, he need not doubt that there will be others, even though they be but few, who will find the results of his mental conflict helpful to themselves. Besides, after all, the work must be judged on its own merits. If there is any good in it, that will, in Coleridge's sense of the word, "find" those to whom it can be of service. And if it finds none, no apology can avail it.

The essays constituting this volume are not entirely disconnected one from another; yet they are not so closely united as the chapters of a single treatise. They have risen one out of the other, in pursuit of the purpose indicated by the second question above raised. The first thought that occurs to any one now-a-days, in considering the relation of our personal life to the world around us, is the plausibility with which materialism offers to explain that relation and both its terms, in expressions of matter and motion. Or if materialism is not always so bold as to pretend now

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to a final explanation, it at least insists that the explanation, if discoverable, would be simply the solution of a problem in molecular mechanics. It has long appeared to the present writer, that the spiritual philosophy opposed to materialism often loses much through a faithless hesitancy to admit, in all their fulness, the palpable facts which materialism has to offer in its own favour. The true policy would seem to consist in going the whole length with all the discoveries to which the materialistic method of enquiry can fairly lay claim. Our object should be to reduce to terms as precise as possible the uttermost phenomena, into which the microscope or chemical analysis converts the general appearances which affect the unaided senses. We should then find that all physical science, if only followed far enough, has metaphysical issues which are full of the profoundest suggestiveness. The first subject, therefore, in the following series, and that which gives, as it were, the key-note of the whole, is "The Mystery of Matter." The only answer that can be made to the suggestions thus obtained is the rejoinder: that what we call the metaphysical issues of physics are only the merging of all articulate know-

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ledge in the noteless and boundless unknown. In the second essay, that on "The Philosophy of Ignorance," an attempt is made to allow full value to this objection, and also to show where and why it fails to arrest the spiritual aspirations of mankind. The faith, however, which prompts these aspirations, is often much misunderstood. It has been thought necessary, therefore, in another essay, the shortest of the series, to discuss the true meaning of "The Antithesis between Faith and Sight." The way is then open for an investigation of "The Essential Nature of Religion," in the course of which it is urged that, though the thing may be called by many names, its essence is recognizable in all the highest activities of human life, even where these have been condemned as irreligious and impious. The subject could not be left here. The signs of the times are too ominous to allow any one writing on such topics to shirk the prospects of the future. And the longest of all the essays is an attempt to show how the experience of past ages, and the knowledge of the present day, unite in pointing to some form of "Christian Pantheism" as the religion of the future.

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I cannot send forth the book without further premising that its pre-eminent, almost its sole aim, is to maintain the reality, the power, and the necessity of spiritual religion. Associated from earliest days, and to the present time, with certain sections of the Church, which are generally credited with evangelical feeling, I must profess that, however they may dislike the opinions here set forth, it is a realization of the value belonging to the inmost essence of their faith which has prompted me to this work. I, for one, cannot remain silent while the inevitable task of reform is turned into a work of destruction. The spiritual descendants of the ancient saints for the most part fail to see how searching and far-reaching is the disintegrating influence of established scientific conclusions upon the whole framework of theological opinion. On the other hand, the prophets of science, dazzled by the wonders they unfold, have often but little susceptibility to those human feelings of the background of existence, which have formed the noblest inspirations of history. It is a case in which not so much intellectual gifts are needed, as a heart-felt appreciation of the power of religion, combined

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with a simple acceptance of facts as proved by others.

Before writing these essays, I had read Mr. Matthew Arnold's papers on "Literature and Dogma" in the *Cornhill Magazine;* though I had not seen the complete work as it is published in a separate form. To the incidental acknowledgement made farther on, I wish here to add an expression of my general obligation to the papers which formed its germ. The extent of my disagreement on some points, both of opinion and feeling, in the expanded treatise will be sufficiently apparent in the sequel. Strauss' volume "Der Alte und Der Neue Glaube," I had not seen, until, as was the case with many others, my attention was called to it by Mr. Gladstone's Liverpool speech. Whatever may be the intellectual brilliancy of that book, there is much in the tone adopted, which would have operated rather as a warning than as an example. Since the whole of the essays were in the hands of the printer, it has been my good—or ill fortune to see one point or another which I fondly imagined might have some little novelty, most ably advanced by others. Indeed, one

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or two coincidences in illustration are so remarkable, that I am only sorry I cannot honestly acknowledge indebtedness to Mr. Thornton, whose clock, in his essay on "Huxleyism," seems to keep the same time with my own in the "Mystery of Matter," or to Mr. Lawrenny, whose experience of wall patterns in a sick-chamber, as mentioned in his paper on "Cause and Design" in the *Fortnightly* for December, 1872, entirely accords with mine, as referred to in "Christian Pantheism."

STAMFORD HILL, *February, 1873.*

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# *ESSAYS.*

## I.

## THE MYSTERY OF MATTER.

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# I.

## THE MYSTERY OF MATTER.

IMAGINATIVE children, especially perhaps those whose spirits are quickened by the thronging impulses of town life, but whose finer feelings shrink from its sordid surroundings, are much given to fits of dreaming, such as "suit the shows of things to the desires of the mind." In sunny weather they will sit imprisoned by tall brick walls in a back-yard, where one or two tulips on a window-ledge stare up at the bit of sky, while sparrows wrangle on the eaves above; and in their day-dreams such young poets will build around them a world which answers to the longing of the heart. It is not pattern goodness, nor is it bold adventure, which forms the motive of the picture that their imagination draws; rather, it is a dim sense of incongruity between that tender winged, fluttering thing, which they are taught to call their soul, and the cruel grimy bars of circumstance which ring it round. It is beauty they want, and wonder, and romance; not so much the



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romance of startling action, as the romance of mystery and delightful awe. And so the dull red walls are changed to rocks of porphyry and jasper: the stupid roar of the street outside becomes the music of the sea, which rises and falls through branching caves: the pavement is dissolved into green transparent water; in the clear depths fantastic coral grows, or splendid shells are strewn. This child that seems lying so still upon a truss of straw, with a broken wheelbarrow by his side, is in reality full of action and joy. He plunges into the beautiful water, and he hears the plash ringing through innumerable arches. The way is open through the depths. He glides hither and thither as he will, without labour or fear. He has made his own world and he is happy.

Years afterwards, the child, now grown a man, worn with labour and scarred with grief, may wander musingly through the dim streets where his life began; and, chancing upon the open door, he stands again in the brick-walled, flag-paved yard, where once he lay and dreamed. Still there are flowers upon the window-ledge; still sparrows wrangle on the eaves; and hardly a touch of change has passed upon the place. But with what a shock of incongruity at first, melting into longing, tearful emotions, does the matured man try to throw himself back into the circumstances of the child! For a moment he is startled at the narrowness and sordidness of the limits within which his young imagination played. But under the

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magic spell of association, length after length of years is measured back, and clouds of forgetfulness are rolled away, until he feels again the glow of those early summer days, when the dull courtyard was transformed into an enchanter's cave. Yet he does not care now to renew those boyish dreams. Nay, he could not if he tried. It is only in the most vivid realization of the material surroundings that he can revive his departed life, and feel the identity of the vanished boy with the present man. Peering about he sees still in its place the broad smooth stone, which was to him in his building enterprises as the threshing-floor of Araunah to Solomon. There are the descending steps, which, when covered by a board, served as a dungeon for his conquered enemies. Up above is the wall coping, to which he daringly climbed, with no less triumph than is felt by a member of the Alpine Club in surmounting the Matterhorn. There are the window-panes through which he caught his mother's face, with now a smile and now a warning glance. And from that door sounded his father's cheery voice, with a summons to a walk, or to the inspection of some new surprising toy. Here again is the wicket through which the laughing eyes of some girl play-fellow peeped on sunny holidays, that she might catch him dreaming, and with a bound startle him from his reverie. How deep is the silence which the memory of those voices makes! For the place that knew them can know

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them no more for ever; and it is always "the touch of a vanished hand"—always "the sound of a voice that is still," which is above all omnipotent to invest material circumstance with a mysterious spell that holds the heart enthralled. It is no longer fancy, it is the doting love for every link of union with the past, which gives to the most forbidding spot a tenderness and beauty of its own.

But farther, this change in the significance of material surroundings is accompanied by another equally characteristic and more suggestive. For, go where he will, he does not need now to shut his eyes to outward things, or transform them by imagination, in order to breathe that air of mystery which so strangely fascinates the soul. Whereas at one time brick walls and gloomy courts must be masked by a drapery of fancy, before the desires of the mind could have free play; now the same mind feeds hungrily on commonest things, and dotes upon a worn flight of steps or a dingy door, as though they were luminous with some hallowed light. Things that he had long forgotten they now bring to mind. Feelings bright and evanescent as cloudland seem to dawn again out of a murky window-pane. And what, he asks, is the magic charm which this dull matter about me wields? Here have these walls stood motionless, inert, while I was far away. The dust and ruin of life's conflicts fell upon childhood's memories, and buried them out of sight. Yet after the lapse of twenty years familiar form

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and colour stir forgotten places in the heart; vanished forms look from the window; voices long silent speak again from the dumb stone. What is the power which these material substances have, to touch in so inspiring a fashion the immaterial soul? Association? Yes, but that is only a name for the fact, another way of saying that the sights and the memories and emotions come back together. To give a name is one thing; to give an explanation is another. What has happened? Certain dirty red rays of reflected light, intermingled with some sparkles of undivided beams, have impinged upon my retina, and have caused, I suppose, vibrations, though I should never have known it without being told, in the nerves that run from the back of the eyes to the optic lobes of the brain. These vibrations coursed along through various complexities, until they reached some ultimate nerve cells and could get no further. So far there is nothing more than vibrations; but somewhere,—shall we say at the other side of these nerve cells?—there comes out something that I cannot in any way identify or connect with vibrations—a sudden memory, a distinct vision, a revived emotion, in which those dirty red rays are altogether forgotten and extinguished. I may be told that the two sets of affections, physical and mental, are associated together in the memory, so that the one recalls the other. I know it is so as a matter of fact; but there is beneath the fact something that I cannot understand.

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Let me keep distinctly in view the two factors in the phenomenon. There are on the one hand certain reflected rays of light impinging upon the retina in a particular pattern; and there are on the other hand certain memories and feelings, of which an hour ago I was completely unconscious,—that is, they were positively non-existent. For the essential characteristic of an emotion is that it is felt, and an emotion that is not felt is nothing in the world. Now I can account for the vibration in my optic nerves, and even for my recognition of it as a familiar feeling. The possibility of it existed all along in these brick walls. I came here, and the possibility was realized. But where was the memory of the old days? Where the forgotten emotion? It could not be in the rays of light, because they would not convey the same impression to any one else. They could not be found therefore in the retina or the optic nerve, which answered solely to the vibrations of light. They could not be in the conscious mental side of the ultimate nerve cells, simply because I was not conscious of them. A man may indeed tell me that there is some infinitesimal speck in a deeply-seated nerve cell, which cherished unknown to me the impressions made so long ago; and that when it was stirred up by the old familiar combination of dirty red beams, its vibrations necessarily shook out again, as it were, the old impressions. But I don't think I should learn much from the explanation; indeed it would

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appear to me, the word association "writ large,"—another mode of stating the inexplicable fact.

Thus it comes to pass that while the child's imagination delights in clouds of fancy that veil the stern features of external life, the matured and thoughtful man delights in dissolving them into mystery, and opening through every stone an endless vista. For it is not only in places pregnant with associations that he feels the subtlety of matter. But everything on which he gazes in the vision of the world hints at an essence which he longs in vain to grasp. The bit of chalk which he crushes beneath his feet, expands under the microscope into a world of minute organic beauty, whose exquisite perfection delights, while its unutterable profusion staggers the mind. The honest daylight loses its simplicity for him, and becomes an incomprehensible ocean trembling with infinitesimal waves which shake the whole universe with their ethereal tremors. The hair of a nettle assaults him no longer with a merely physical sting, but pierces his very soul with the materialistic suggestions which its protoplasm inspires.

For, not through any hostility to science, but just because of his susceptibility to the fascination of its discoveries, such a man will in all probability find the atomic theory of matter a burden and a terror. He has travelled; he has watched the sunset on the sea; he has worshipped, like Coleridge, in the valley of Chamounix; he has found that piles of earth and tons

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of water can be so arranged as to draw from him tears of longing and rapture; he has begun to regard material forms no longer as prison-bars shutting in his soul, but rather as organ keys, by means of which some mysterious power calls forth a flood of music to which they have no resemblance. Let any philosopher then prove to him, as indeed it is easy to do apparently and plausibly, that this gloriously-real world, so far surpassing his childish dreams, is ultimately reducible to little kernels of an insensate substance, which has no attributes whatever except dead impenetrability, unloving attraction, stolid repulsion; and the philosopher will appear to be offering simply the strongest reasons for suicide and a speedy return to the atomic, or at least molecular condition. And if he is strong enough to face steadily the questions which are now raised, such a doubting soul will feel that there is no return for him to the high *a priori* road of predisposition* and assumption; there is no retreat for him to his old dual conception of mind and matter, master and slave. There is only one escape possible from the horrible oppression of a universal death. He must go right through materialism and come out at the other side, where it merges into pure spiritualism. And happy will he be, as well as wise and valiant, if after a dark hour,—the "darkness that may be felt," the darkness of a man who wakes to find himself buried alive,—he sees

* Predisposition, however, has its value; see "Antithesis of Faith and Sight."

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at last the whole phantasmagoria of palpable things cleared away, like clouds drunk up by the sun, into the grand and blessed unity of substance, light, and life.

This is not the experience of an individual merely: it is the story of the race. For early generations, like imaginative children, veiled the external world in a mist of fancy. Not knowing the true inherent wonder of the world, they adorned it with dreams of gods, fairies, or genii. They crowned the rocks of Olympus with airy palaces. They imputed a personal life and will to every stream and every wind. The mind, as it worked, wrought only one result: all its "makings" were poetry. There was no perplexity then involved in the apparent contrast between mind and matter. For imagination mastered matter, and adapted it to the desires of the mind. And one may well understand how, when philosophy had developed the notion of a matter,—*materia*—*hylè*—distinct from and logically opposite to mind, the living spirit of man felt a revulsion from the thing so presented, and often identified it with the very essence of evil.

But with the progress of civilization history, the generic memory, arose; and then, sanctified as the birthplace of wisdom or heroism, many a classic ground was exalted beyond any claims that nature had bestowed; because it was transformed by the touch of association. To the early settlers I suppose the land of Egypt was attractive mainly because of the facilities

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which it offered for the supply of their bodily needs. It was the scene of hard labour, too, where each man "cast his bread upon the waters that he might find it after many days," or "sowed his seed and watered it with his foot as a garden of herbs." And they soothed the hardness of their lot with pictured imaginations of the spirit-land, where kings lie in their glory and the slave is free from his toil. But to later generations, notably to the Greeks, Egypt became the land of sacred wonder. Its river was a mystery. Its tombs were as the threshold of eternity. Its temples were homes of divine wisdom. And all its attractions sprang from this, that it was a land rich in human experiences and sanctified by a thousand memories, which made the silence of its monuments more eloquent than speech. Homer must needs crowd the plain of Troy with supernatural beings to make it a fit arena for his imagination. But now its very desolation inspires; and plain and mountain, stream and sea are irradiated by the enthusiastic memories of the beholder. To Homer Scamander was a living power; and its floods were actuated by angry passion to compass Achilles' death. To the modern traveller it is a puny stream; yet somehow spiritualized into grandeur by its suggestions of a departed world.

But this modern traveller, if he sympathizes with the new life as well as the old, has no need of the spell of association to invest matter with fascination. The microscope and the telescope, spectrum analysis and

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biological research have made it impossible to watch the motes in a sunbeam or the faintest twinkle of a star without a sense of exhaustless mystery. When the Israelites, rising early in the morning, saw the earth covered with strange food from heaven,—"white like coriander seed," we are told—they were startled like children who look out of their windows and for the first time in their lives see the ground covered with snow. "Man—hu?" What is this? they cried; and not being able to give any answer, they kept the wondering question for a name. It is not the only case in which a name has been expressive of ignorance rather than of knowledge. At least this is, it seems to me, by far the most significant result of all the splendid boasts of modern science. No doubt, after some achievements of knowledge, especially as applied to useful invention, the first feeling was one of almost contemptuous triumph. Men talked with pride of the mastery wielded by mind over "brute matter," which they blasted with gunpowder, and squeezed in hydraulic presses, and welded by steam hammers, and compelled by torture of fire to submit its gigantic forces to their will. And the soul was undisturbed in its complacency, because every result achieved seemed only to concentrate attention the more on mind and will as the supreme wonder of the world. But of late years a change of tone has been manifest; and matter itself in its ultimate constitution has become the object not of philosophic inquiry only, but of an

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enthralling interest, in which vague feelings of alarm and jealousy add to the keenness of curiosity. For the once despicable element, armed by physical science with weapons of deadly precision, threatens to turn the tables on mind, and to reward hasty contempt with the doom of annihilation.

The truth is, that in modern times science and philosophy combine to make impossible that old sword-and-sheath, or shell-and-kernel theory of the world, by which men once expressed the unfathomable contrast of "within and without." The intimacy of relationship which scientific research establishes between soul and body is such, that one feels relationship to be hardly the word to express what looks much more like identity. And when once this is realised, it becomes impossible henceforward to find satisfaction in the ordinary dualistic notion of two ultimate substances fundamentally and essentially distinct. The issue then *seems* to be blank materialism. But when a steady effort is made to follow up materialism to its innermost significance, it is found to be as penetrable as one of Pepper's ghosts: we pass right through it, and come out at the other side,—some say, into the formless void of infinite ignorance, but as others think, into the assured consciousness of eternal, all-comprehensive, all-pervasive Life, as the only substance. Thus Berkeley's idealism with a difference, and Spinoza's pantheism with a difference, are pressed on the consideration of ordinary readers and thinkers now by

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methods which these prophetic minds, far-seeing as they were, could hardly anticipate.

It will be a sufficient illustration of these remarks if I refer to the effect produced on the public mind by two celebrated discourses of Professor Huxley—a man who, I venture to think, has rendered services to the Church, if less signal, yet not less valuable than those which he has rendered to science; for he has not only brought religionists face to face with facts, with a vigour and a clearness almost peculiar to himself, but he has made concerning those facts suggestions of more importance to the future of religion than he himself perhaps would dare to promise. The two above-mentioned Lay Sermons, on "the Physical Basis of Life," and on Descartes' "Discourse, &c.," have undoubtedly defined the only terms on which an ultimate and thorough reconciliation is possible between physical science and spiritual religion.* Rivalling Berkeley in sparkling distinctness of statement, while of course far surpassing him in knowledge of physical phenomena, Mr. Huxley has shown, with a force amounting to demonstration, that by whichever path we set out, whether that of Materialism or that of Idealism, if we only go far enough we are brought to the same point. Whether this great master of fact and language was equally happy in his discussion of Bishop

* Mr. Herbert Spencer had done the same thing before, in a different way; but of course the biological questions treated by Mr. Huxley awakened popular attention, as a work on philosophy could hardly be expected to do.

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Berkeley, it would be presumptuous in an obscure critic to offer an opinion. But one cannot help feeling that if the multitudes who read with the eagerness of fearful curiosity the "Physical Basis of Life," could have been disabused of their supposed knowledge about certain ultimate properties of matter, they would have ceased to anathematize as a materialist one of the most powerful opponents, and perhaps the most completely armed, that Materialism has ever had.

For all that the distinguished speaker did in this discourse, was to call attention to certain indisputable facts. And perhaps it was the impossibility of denying these facts, which was a main cause of the uneasiness that most of us felt. Thus he told us that all organisations, from the lichen up to the man, are all composed mainly of one sort of matter which in all cases, even those at the extremity of the scale, is almost identical in composition. And the one other fact on which he insisted was, that every living action, from the vibrations of cilia by the foraminifer to the imagination of Hamlet or the composition of the Messiah, is accompanied by, and in a sense finds an equivalent expression in, a definite waste or disintegration of material tissue. Thus it is no less certain that the muscles of a horse are strained by a heavy load, than it is that the brain of a Shakespeare undergoes molecular agitation, producing definite chemical results, in the sublime effort of imagination.

Besides these facts there were some few assertions,

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denials, and inferences, which suggested fair matter for argument, and were accordingly fiercely debated. But I do not at all believe that these more original elements had very much influence in producing the excitement which followed. The surprise, the shock, and the prolonged uneasiness realized by so many minds were, I think, really caused by the lucid and telling statement of facts already known and indisputable. Many of us perhaps learned a little animal physiology at school. But I venture to think that not one in fifty of the readers of that discourse had ever tried to realize what they meant by the union of soul and body. And if they ever did try to think about it, the distinctness of the two was nearer and clearer to consciousness than their alliance. Hence when such readers were told that the soul never does one single thing by itself apart from some excitement of bodily tissue, they experienced a shock, which was all the more unpleasant because it was impossible to deny the fact. That thought and love and indignation and fear, which in one direction find their expression in majestic eloquence, should in another direction find their expression in the production of carbonic acid urea and water, seemed altogether monstrous and terrible. Such a union as this between soul and body seemed logically to amount to identity. And yet the poor soul felt that, whatever might be said, still it knew that it was not carbon, oxygen, hydrogen, or nitrogen, nor yet all of them put together. Hence

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arose an apparent schism between logic and consciousness; which was very distressing to many minds. The distracted reader scarcely thought of asking himself how much he knew about carbon or oxygen or the rest of them. The fact that he could not think about them without producing them was something frightful; and therefore in all probability he betook himself to the usual resource of mental helplessness, whether in ecclesiastical conclaves or pot-house debates—he took to cursing.

When, for instance, ordinary men are told that "sooner or later we shall arrive at a mechanical expression of consciousness, just as we have arrived at a mechanical equivalent of heat;"* and when they hear this assertion illustrated by reference to a pound-weight falling through the distance of a foot, and giving rise to a definite amount of heat as its equivalent; such hearers instantly picture to themselves a pair of scales with a man's soul placed on the one side and a pound or a ton weight, as the case may be, on the other. And they persist in supposing the speaker to mean that the conscious life of the one is equivalent to, in the sense of being worth no more than, the (supposed) unconscious mechanical force of the other. They conceive the soul transmuted into a potato-dealer's iron weight, and they shudder with a righteous horror of such a materialistic doctrine. Yet, if they could but realize that all their knowledge of weight is the conscious

* Lay Sermons, &c., 1870, p. 372.

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apprehension of force in one form, and that all they know of the desire to lift it is the conscious apprehension of force in another form, they would themselves feel how possible it is that the one form of force might be expressed in terms of the other. They might or might not agree in the possibility of applying this mode of interpretation to all the subtle variations of conscious energy, but they would at least acquit the proposal of "gross and brutal materialism."

The truth is, that in these days of Mudie, and Library Companies (Limited), thousands, if not the million, read much which they have just education enough to misunderstand; and no lucidity of exposition can save us from errors occasioned by inveterate inaccuracy on our own part in regard to the most elementary terms. The rough philosophy of ordinary intelligence recognizes, or fancies that it recognizes, two utterly distinct kinds of existence—one called matter or body, and the other spirit or soul. Such rough philosophy may be sufficient for most practical purposes; but it is liable to be sorely perplexed by lectures on "Protoplasm." For in the common view these two kinds of existence are so essentially different, that no transition is conceivable from the one to the other, and, indeed, no higher generalization can possibly combine them in real unity. To such a view the word *universe* must be a misnomer. There is no ultimate oneness of things. And therefore every approximation to a final general-



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ization, whether from the side of science or of religion, excites suspicion and fear just in proportion as its drift is perceived. For the false assumption, like a trivial error in the terms of a calculation, though of no practical import within a narrow range, becomes more and more perplexing and possibly disastrous, as the magnitude of the problem grows. Tell the believer in two substances that all living organisms, from the lichen up to man, are composed mainly of one sort of matter, which in all cases, even in those at the extremity of scale, is identical in chemical composition, and your hearer may only be interested and surprised. Tell him that every vital action, from the vibration of cilia up to the contemplations of a saint, is accompanied by, and finds an equivalent expression in, a definite waste of material tissue: discomfort and suspicion will be the result. Tell him that all species and all generations of the animal and vegetable world have been produced, under discoverable laws, by gradual modifications of one original and everywhere identical protoplasm: his face will flush with indignation, and anathemas will rise to his lips.

Certainly the sort of mental anxiety to which I allude has been a good deal aggravated by the increased and increasing hold which the doctrine of development, in one form or another, has indisputably taken on most inquiring minds. Natural selection may or may not be regarded as sufficient to account for the origin of species. But I am stating a

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mere fact, and not upholding any theory, when I say that the notion of successive acts of special creation out of nothing, or out of inorganic dust, has been virtually abandoned by all whose observations of nature have been made on such a scale as to entitle their opinions to any weight. And those ordinary readers who have intelligence enough to note this fact are usually possessed by the feeling, right or wrong, that if once the doctrine of development be fairly established in regard to the brute creation, the arguments for extending it to man will be irresistible. Whether that be the case or not, it is certainly true that our interest in the ultimate constitution of matter derives a terrible eagerness from the rapid growth and prevalence of theories founded on the doctrines of continuity, development and the correlation of forces. Now, it is not my business here, nor does it lie within my capacity to uphold such theories on scientific grounds. But, at any rate, they exist. They rest on large inductions. They are receiving fresh accessions of evidence every day; and surely, unless truth absolutely requires us to do so, it is not wise to risk popular confidence in the supremacy of spirit and life in the order of the world on the chance that those theories may ultimately prove to be false.

For the purpose of the present argument, however, it matters not whether the theories referred to are true or not. They assert, at any rate, that unity of the world, which in some form or other must ultimately

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be accepted; and at which, in any form, believers in two substances must stumble. It is the slow, but most perceptible current of popular thought towards the last generalization, the idea of a *universe*, which is the real cause of all the perplexing eddies in side channels and private mill-dams of theological vested interests. Suspicion of miracle, impatience of the Athanasian creed, discomfort at the notion of creation out of nothing, all of which are signs of these times,—in a sense in which they never were of any other age,—derive their whole force from that sense of a comprehensive unity to which the discoveries of modern science have given so grand an awakening. Whoever then contributes a side light, a shade of thought, a suggestive word on the mystery of matter, is doing what he can to hasten that day when "God shall be all in all."

Let us try if we cannot conceive clearly the mental condition of a man who feels most acutely the apparent encroachments of materialism. Such a man uses familiarly the word "substance," in what he thinks to be a clear and definite sense; although, ten to one, he has never put his definition into words. Roughly, I think, we may say that anything he can thump or squeeze or crush, anything that resists him, however delicately, like a waft of air, is a substance. Good Dr. Johnson, when bewildered by Berkeleyite subtleties about the non-existence of matter, indignantly thumped his fist on the table and exclaimed, "Here it is, sir! here it is!"

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He, evidently, philosopher though he was in Boswell's eyes, shared that position of the common mind which I am now endeavouring to describe, and regarded as substance anything which in any degree withstands the fist. Hence bricks, iron, wood, feather-beds, water and gas are all substances. Fire is doubtful; still, as it swallows up other substances, newspaper reporters may be right in calling it "the devouring element." Electricity is more doubtful still. It may be called "the electric fluid." But there is a mystery about it, which to the common mind is inconsistent with honest substance. *Light* is a puzzle. The ordinary mind does not regard it as a substance, and yet it always streams from a substance; but until attention and reflection are thoroughly excited no inconsistency is felt here. So far, then, all is plain. The common observer knows himself to be surrounded by many substances, which he is sure are no part of himself, and which seem, for the most part, in themselves heavy, stupid, inert. There is no mystery at all in this, he thinks. Here is the realm of common sense and tangible evidence. But now, when he comes to think of himself, here he apprehends a mystery. He does not realize his own existence as he does that of material substances around him. Certainly we have heard of people pinching themselves when confounded by surprise, to convince themselves that they were really present in the flesh. But as a general rule a man does not come to self-consciousness by feeling his ribs, or by biting his

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lips, but by a direct perception, which is like nothing but itself. Accordingly the common mind draws a great distinction between its perception of itself, and its perception of substances around. And to that subtle essence, which it feels itself to be, it gives the name of spirit. It would not, I suppose, always call spirit a substance. But whatever names be used, in effect it comes to this, that the rough philosophy of common sense recognizes, or fancies that it recognizes, the existence of two utterly distinct kinds of substance, one which it calls matter or body, and the other spirit or soul. According to this view matter, however ancient, is a new thing in the universe. Spirit alone is eternal. And as matter is utterly and fundamentally different from spirit, with no possibility of a transition from one to the other, it follows that matter must have been at one time called out of pure nothing into sudden being. This, of course, has not been always held. For many of the ancients regarded matter as eternal. Partly, however, from a natural and proper intolerance of two diverse substances equally eternal, and partly from a forced interpretation of certain passages of scripture, which will fairly bear a very different construction, the ordinary common sense theory of the world now insists on the creation of matter as well as individual souls out of nothing at all. Then, of course, matter being solid, inert, incapable of feeling or consciousness, is associated with clearness, tangibility, mortality, and evil; while spirit is

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mysterious, etherial, the true vehicle of life, the proper and only subject of religion and immortality.

Such being the theory of the world as embraced by the common mind, there is little wonder that lectures on protoplasm, especially when combined with theories of development, should cause many a flutter of heart; which, by the way, is all the more painful because it seems to confirm materialism; and many a snarl, which according to Dr. Darwin goes far to prove the theory which excited it. For if every possible mental energy finds its equivalent expression in mechanical or chemical terms, it is impossible to avoid an uncomfortable suspicion that the distinction between soul and body is not quite so clear and utter as we had thought. And if in the course of the next generation it should really come to be believed that the whole power and glory of the living forms which throng and adorn, and even subdue the world, have been gradually evolved out of a speck of irritable jelly; alas, alas, for the noble dream of a God-breathed inspiration and a divine image in man! Alas for the sacred roll of promises that gleam, and rebukes that burn, and living words that empower the faint! All, all will be gone, but only one doleful utterance—"I said in mine heart concerning the sons of men that God might manifest them, and that they might see that they themselves are beasts."

It is evident, then, that the terrible conclusions, too hastily formed by hearers of lectures on Protoplasm,

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proceed entirely on the common assumption that what we call matter is something fundamentally and essentially different from spirit; something heavy, lifeless, inert; something that lies hid beneath, and is the foundation of the etherial vision of the world. But if that assumption be wholly gratuitous, the mere creation of false analogy; if, when closely examined, it resolves itself into a tissue of incongruities, mutually destructive, unthinkable, impossible; we cannot say that such a conclusion solves for us the riddle of the earth; we cannot say that materialism, in a fair sense of the word, becomes impossible; but we can say that materialism and spiritualism would then be felt to exhibit different aspects of the same everlasting fact; and physical research might henceforth unfold to us only the energies of Infinite Life, self-governed by eternal law.*

* The general line of argument which follows is of course suggested by Professor Huxley in the two Lectures on Protoplasm and on Descartes, to which allusion has already been made more than once. Readers must judge whether the aim and application are so far identical as to make a re-statement in my own way needless. But the argument has been involved in all spiritualistic as distinguished from materialistic philosophy, almost since human thought first began to wrestle with the enigma of the world. And if in the present age, anything of the kind should be thought new, it is for the same reason that has made assertions about protoplasm or bioplasm seem bold and startling. What was once the property of a few isolated thinkers, has in our time been popularized and made accessible to minds of ordinary intelligence.

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Which amongst the innumerable facts that store the memory even of the most ignorant, is that of which we are most confidently certain? There can be little doubt about the answer. Children, fond of emphatic utterance, but innocent of all expletives, will often strengthen their assertions with the addition "as sure as ever I'm alive." And in such words, without knowing it, simple souls of maturer growth often illustrate and endorse the principle of Descartes, who reared his system of the universe from the apparently syllogistic, but really identical proposition, "I think, therefore I am;" *i.e.*, "I am thinking, therefore I am a thinker;" or "I am, therefore I am." But the fuller form of the proposition is not wholly unmeaning. For, bearing in mind how Descartes included under thinking all modes of sentiency, we may say that the fuller form reveals what is true but not generally recognized, that the substantive verb always carries with it the notion of thought *in* the subject of which it is predicated. This is obvious with regard to the first person, "I am;" for to say that a man can himself separate the notion of his being from the notion of his sentiency is absurd. But surely it is no less true of the second person, "thou art;" for though a poet may address a mountain or a statue, by the very hypothesis of personification he attributes sentiency to the subject. And it can scarcely be contended that the inflection of the third person wholly changes the meaning of the verb. In

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other words, our notion of being is always and necessarily that of conscious being. Our first recognition of existence is in the form of life; and we only delude ourselves when we fancy that we eliminate life from our notion of objects around us. At any rate, this, the knowledge that I am alive, or the fact that I am conscious, is, in the mind of the simplest as well as profoundest, the one point so certain that it serves as a standard by which to judge all others. Now this only amounts to saying that our first and elementary recognition of existence is in the form of life. It may be, and doubtless is true, that no baby knows, or can be correctly said to feel that he is alive, until he opens his mouth and is astonished by the noise that he makes, or till he unfolds blank, meaningless eyes to the wonder of light. But no one will venture to say that in either instance he learns anything whatever of a world outside of him. We cannot be far wrong in thinking that he is simply roused to a dim, inarticulate, unrecorded and irrecoverable sense of indefinite life. The feeling, therefore, that we are alive is the prime, continuous, and fundamental perception which gives content to all others. We may talk about eliminating consciousness and forming an abstract idea of being; but it is only talk, nothing more. We never use the substantive verb without attributing some sort of life definite, or indefinite, to its subject. The first fact of existence, and the only one of which we have such an immediate

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cognition, that in it subject and object are one, is, if not living substance, at least the phenomenon of life.

But how do we know that anything else exists beyond the life we realize in ourselves? Says Common-sense "Seeing's believing; but feeling has no fellow; I see them, and feel them, and hear them, and taste them, and smell them; therefore I know that a world of things exists around me." This argument is not to be despised; it is genuine and sound; irrefutable by any amount of metaphysical subtlety. But the question does not concern the existence of those visions, or feelings or sounds, or tastes, or smells. They are indisputable. Nor, again, does it affect the existence of real causes for them. But what it does touch is the *nature* of those causes. And if it be said that they are caused by an unliving substance, a dead matter, which is fundamentally different from the mode of existence which we know in ourselves, the assertion is one for which no tittle of proof can be found.

It may not perhaps be wholly unnecessary here to remind some readers that the doctrine of Bishop Berkeley has been persistently mistaken on this point. For it has been supposed that he denied the existence of the external world, and thus for a pedantic whim insulted the common sense of humanity. Of course he never dreamt of doing anything of the kind. Indeed, he rather believed it to be his mission to vindicate common sense against the far-fetched explanations of philosophers. Never did he for a moment treat the

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external world as an unreal dream. He constantly insisted, rather, that the question he discussed concerned only the underlying basis or cause of the external manifestations that affect us; a question of which common sense is for the most part entirely oblivious; but in regard to which it easily suffers itself to be grievously deluded. As a clear understanding of the position thus generally indicated is becoming absolutely essential to any calm estimate of the apparently materialistic bearings of recent biological theories, a few words of exposition from one, who has felt the pressure of these questions but who makes no pretence to profound or original research, may not be without their use to the class of readers alluded to above.

Engaged in my work, and needing to note the passage of time, I look at the clock, and am straightway conscious of a complex sensation, accompanied by certain thoughts. I am conscious of a sensation of a circular form, and of a white surface distinguished by black marks. I am conscious also, perhaps, of an uncomfortable feeling that time is flying rapidly, and that only a few moments of certain allotted hours are left to me. For I gave myself three hours—from ten to one o'clock—for a particular purpose; and now the clock tells me that it is half-past twelve. "Tells me!" I cannot help imputing an intentional meaning to the clock-face; and the lively figure of speech ordinarily adopted is only a fair expression of

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what the clock is generally supposed to do. I can, of course, on reflection, easily convince myself that the whole significance of the object—all notion of the twelve hours, and of the sixty minutes, and of the time that remains to me—is not in the clock at all, but in myself. Yet I find it requires very considerable effort to separate that round white face and those black marks outside of me, from the impression of the time of day which I feel within me. So prone are we to predicate of things outside of us the attributes of life, while yet we profess to conceive of them as dead. But let us suppose this error discovered and corrected. In contemplating the clock in itself, then, we have got rid of all notion of time—of all significance, which, on reflection, we find to be due to living association of ideas, and which we are quite sure is in us and not in the clock itself. All that is left now is a circular white space with black marks on it. This much, at least, it may be urged, is clearly outside of us. And yet if it is so, the clock must certainly be alive. For what do we mean by "white?" We mean a certain feeling or sensation which we associate with the word. Thus, if I mention the word, you can recall the sensation; and if I hold up a white cloth before you, you may say, "Yes, that is what I mean," because you recognise the sensation of whiteness which is revived. But if the cloth be fairly opaque, and I hold it up between you and the sun-light, then it excites no sensation of whiteness, but seems as nearly as possible

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black. Yet the cloth itself is the same, and the whiteness or blackness is in the observer. My interlocutor, however, being a man of strong common sense, may catch me up sharply, and say, "No; the blackness or whiteness depends on the incidence of the light, and is still at the surface of the cloth." To which I should reply that the *cause* of the sensation of whiteness may undoubtedly be at the surface of the cloth; but the very mention of the light shows that the whiteness itself is in our eyes, or rather in the living self at the other end of the optic nerve. And therefore, when we apply the epithet "white" to our clock-face, we describe not what that object is in itself, but the sensation which it excites in us.

In other words, every act of perception involves two factors,—a perceiving subject and a perceived object. But we have no right whatever to invest either of these factors separately with the whole value of the two brought into conjunction. When we ourselves are gone away from the object, we know that our memory lacks the vividness and "outness" of the present sensation. And if the one factor, when removed from conjunction with the other, is modified by the separation, so is the other. We cannot logically leave the object invested with those sensations which it indeed produced in us, but which were a part of ourselves and not of it. For that which is acknowledged to be an effect produced on a living susceptibility cannot possibly be left behind when the living

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susceptibility is removed. Of course, in the language of common sense, the clock-face is white when left alone in the deepest darkness, equally as when, illumined by the lamp, it warns us of the flight of time. But then the language of common sense is not, and need not be, exhaustively accurate. In the present instance it roughly expresses the indubitable fact, that the clock-face will retain its power of exciting, under certain conditions, the sensation of whiteness in our minds. Yet, for the purpose of our present argument, it is of the highest importance to fix in our minds the exact truth, which is this; that what we leave behind us when we take our candle and go to bed, is *not*, in the full significance of the words, a white clock-face, but something which, if we come back again with a light, will again awaken in us the sensation of the present moment.

It is obvious that the same reasoning would be equally applicable, not only to the round form and to the black figures, but also to the tick of the pendulum, which affects an entirely different sense. Some difficulty may be felt in realizing that the hardness and smoothness which we perceive through touch, are just as much in ourselves as is the white colour, and incapable of existence unless in the actual contact of our hands. But as this would necessitate a discussion of impenetrability, which may be better approached presently from another point of view, I shall best consult economy of space, without injury to ultimate com-

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pleteness, by assuming now that the argument exemplified in the above illustration is applicable to all the senses alike. Let not the drift, however, be mistaken. The common sense of humanity is right enough in insisting on the reality of the external world. And all that our argument amounts to, so far, is this,—that our sensation is one thing, and its cause or occasion another; and farther, that simple sensation does not tell us what that cause is. If we ask what causes our sensation of whiteness in looking at the clock, we have no right to answer "white colour;" for the epithet expresses a sensation which must be in us, and cannot possibly be out of us. If, then, the cause be not white colour, what is it?

As simple sensation cannot answer, science has taken the matter in hand. By a minute observation of innumerable sensations, and by elaborate calculations and reasonings founded upon them, physical philosophers propose to reduce all our perceptions, and everything else about us, to a system of molecular mechanics. I am not going to complain of this proposal, or to anathematize its materialistic tendency or method. The method *ought* to be materialistic; the more so the better; for that is only another name for precise observation and accurate inference. But as to the tendency, we shall see. To my mind, to accuse molecular mechanics of a materialistic tendency, is about as reasonable as it would have been to accuse the first aeronaut who ventured to explore the clouds, of a

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voyage into outer darkness. In good time we shall all come through to the other side. Only let us go deep enough; only let us get hold of our molecules and atoms—if we can. There is no fear of the result. But, meanwhile, I venture to suggest as the next step in my argument, that while simple sensation has nothing to tell us about its cause; except that it is not ourselves; physical research, so far as it has gone, gives us a cause which is not only nothing like the effect, but totally inadequate to account for it.

Let me illustrate what is meant. Looking at the clouds of sunset, what wonderful visions we sometimes enjoy,—castle, and spire, and city, palaces resplendent with gold and purple, fiery caves and gorgeous mountains. To the child they present a fairy-land quite sufficient to confirm the adventures of Jack at the top of his bean-stalk. And the little seer ponders how daintily his foot would tread the golden floors, and what supreme lordship he would feel, enthroned on those shining peaks. If then some remorseless iconoclast of romance were to carry him away in a balloon, and, favoured by the winds, were to plunge him into the world on which he dotes, how bitterly disappointed the child would be to find his beloved vision melt away into dismal damps, white ghostly mists, with no power but to baffle, and blind, and chill! No doubt, if he should pass right through into the boundless light beyond, his confidence would be restored, and his joy redoubled. But no explanation



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would enable him to identify in his consciousness the splendid vision either above or below, with the dull molecules of choking fog into which he had been plunged. So, when science takes us children of a larger growth, and to exhibit to us the secret of colour, plunges us into a mist of vibrating molecules or atoms, we find it impossible to identify in consciousness the notion of vibrations with the phenomena of experience. It may be we shall pass through the mist some day, and know the eternal boundless life which it, so to speak, refracts and reflects. But not in trembling atoms do we, or shall we ever find any adequate explanation of the glorious visible world.

Suppose yourself to be looking up, not at the clouds, but at a palace ceiling illuminated with brilliant colours. No minute examination at the top of a ladder will do for us here what we supposed the balloon voyage to have affected for the child. However we may fly through the clouds, we are quite incapable yet of carrying our consciousness through a coat of paint. But science professes fully to explain to us the delight of our eyes. We have all heard in these times of the ether and its wavelets, which, vibrating billions of times in a second, carry everywhere the glory of light. We all understand that these ethereal wavelets, impinging upon molecules of pigment, have part of their movements absorbed, and part reflected in various degrees, according to the peculiar nature of the pigment employed. But as action and re-action are equal, we

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must suppose the etherial wavelets which are thus turned violently back in their course to affect the molecules with their own motions. And indeed according to this theory, which, so far as it goes, I do not for a moment doubt, the only reason that can be given for the different colours of molecules is their adaptability to absorb or reflect a few billion vibrations more or a few billion vibrations less in any given second of time. We must conceive, then, that the superficial molecules of our illuminated ceiling are kept in a constant state of agitation under the beating waves of the light.

Now, as Milton's imagination reduced his unmanageable host of devils to pigmies in order that they might be squeezed into the Pandemonium, we may venture to reduce our own more estimable persons in thought to a minuteness beyond the range of microscopic perception. If, at the inner end of the optic nerve, there are brain molecules capable of marking time to the wavelets of light, we may suppose our whole consciousness to be concentrated in such a molecule. Having then reduced ourselves to a size indefinitely smaller than that of the smallest perceptible animalcule, we may insinuate ourselves amongst the agitated particles of our illuminated ceiling, and thus follow up to its last retreat the mystery of colour. But it may fairly be questioned whether the result would answer our expectations, any more than the child's investigation of the sunset clouds would be in accordance with his.

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Surrounded on every side by perceptibly dancing molecules, of whose actual motions we were conscious, we might feel as though enveloped in a cloud of dust agitated by the wind, or as though rolled amongst pebbles shaken by the beat of waves on the beach, but as to the efficient and formative cause of the brilliant vision we had seen below, we should be as much bewildered as the child plunged into the cloud.

This is only one illustration out of innumerable others which might be given to show the impossibility of realizing in consciousness the explanation offered by molecular mechanics of the phenomena of sensation. And nothing is really an explanation which cannot be realized as such in consciousness. What we want is a cause, out of which we can rationally educe the effect. When, for instance, we are told that the perception of distance is given partly by the muscular sense accompanying the adjustment of the axes of the eyes, partly by association of certain directions of lines and various degrees of dimness or clearness, with experience of touch and motion, this, so far as it goes, is an entirely adequate explanation. No question is here involved of the ultimate constitution of the outer or the inner world. But the phenomena being assumed, every one, by the exercise of a little reflection, is able to realize this explanation in his own consciousness, and rationally to connect that muscular sense and the experience of touch with his perception of distance. For every one, when his attention is called to it, knows that a

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muscular effort is required for the adjustment of the eyes to various distances; and even after long experience illusory appearances of distance or nearness occasionally illustrate the uncertainty of sight apart from the interpretations of the other sense. This, then, I call an adequate explanation so far as it goes; one which can be realized in consciousness.

But with the explanation of sensation by molecular mechanics the case is far otherwise. For physical research, rightly pursuing its materialistic method, lands us in a dead, inert substance, called matter, which, though utterly soulless and meaningless in itself, does, nevertheless, by its shakings and rumblings, produce in our conscious selves the most beautiful visions and exalted emotions. Now, I do not dispute the vibratory theory of light; and, of course, that of sound is indisputable. But what does it amount to in either case? Simply to this, that when we carefully and minutely examine the external phenomena inseparable from our consciousness of sight or sound, we find that they resolve themselves into other phenomena having the form of infinitesimal vibrations, which it is quite impossible rationally to connect with the consciousness that gives them all their interest.* I repeat then that while simple

* Perhaps it may be thought that in the case of sound its identity with vibrations may be more easily realized. But I put it to any one to whom the Hallelujah Chorus utters the joy of heaven, or for whom a sonata of Beethoven's gives a voice to the unutterable, can he make it seem real to himself that his mind is invaded by mere air waves?

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sensation has nothing to tell us about its cause, except that it is not ourselves, physical research, so far as it has gone, gives us a cause which is not only nothing like the effect, but totally inadequate to account for it. Science has brought us into the cloud, and this is very different from the vision that prompted our voyage of discovery. But we cannot stop here; and science or something else will ultimately take us through to the other side.

Physical research boasts its dependence on observation, which is only another word for the industrious and accurate employment of the senses. And its history has been to a large extent a process of correction, ever approximating to, but, in the nature of the case, incapable of attaining absolute truth. If then the last correction has given me a system of molecular mechanics, have I not a right to speculate on the probability of some further correction still? My simple senses, for instance, tell me as I look down the road that there is a figure in a red cloak half a mile away. Dr. Tyndall's much more subtle perceptions, aided by prisms, electric lamps, screens, and I know not what, enable him to correct the simplicity of my sensations, and to assure me that, whatever may be the case with the figure and the cloak, the red colour is certainly *not* half a mile away, but here only, in my eyes or in my optic lobes. He further corrects my observations, if I rightly understand him, by informing me that the presence of this colour here is due to the

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existence of molecules there which vibrate in such a fashion as to absorb the violet and gold rays while they repel and reflect the red. And, still farther, I learn that the medium of communication between me and those distant molecules is an attenuated "jelly," called ether, which is so extremely subtle that it pervades all substances, and which is liable to vibrations of a stupendous and unimaginable velocity. It is all, then, a matter of molecules. The cloak, the ether, my retina, optic nerve and lobes—all are reduced to a system of molecular machinery so devised as to reflect, transmit, or receive vibrations of matter which run throughout the whole chain.

Now, I do not in the least dispute the correction. I am unable to carry out the investigation for myself; but I am perfectly satisfied with the evidence of eminent men, that when my rough summary of sensation is closely examined, other phenomena unobserved by me are discovered, and that these at length reduce themselves to phenomena of molecular agitation. Farther, at no point in this chain of vibrations, not even the point most deeply buried in the brain, is it possible to conceive this molecular agitation converted into anything other than material movement, or resistance to movement. Let any one in thought follow up the ethereal vibrations to their last flutter in the inmost recesses of the brain; and let him try to form a clear idea of what happens there. It is useless to say that he will not try; that it is a mystery which he

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leaves alone. Because in the very act of refusing, he does conceive the chain of vibrations to come to a dead stop, and something infinitely different, utterly incommensurable with them to take their place. For my part, having submitted so far to the teaching of physical philosophers, I am constrained to go farther, and admit, that to my mind, material movement can produce nothing but material movement; that the feeling produced by molecular vibration must itself be a form of molecular vibration; and, in fine, I must concede to Professor Huxley, that "thought is as much a function of matter as motion is." But then the whole significance of the concession depends upon the meaning that we attach to the word 'matter.'

For if any one should straightway convict me of "gross and brutal materialism," I would beg him to remember that this conclusion is only an approximate correction of the vague notions with which we began. My "simple senses" informed me incorrectly about their method of operation. They told me of a red colour half-a-mile distant across a vacant interval. But the more cultivated senses of scientific people, aided by delicate instruments, resolve these appearances into phenomena of agitated molecules. I am thankful for the correction; but if too much should be made of these molecules, I have a right to urge that there is no finality here. This correction may need correcting; and these vibrating molecules may turn out to be something very different from what they seem. In

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fact, they must do so; for the common notion entertained of them, even by some scientific men, compresses a whole world of absurdity and contradiction into every point of space. But if so, it is conceivable that through the word "matter" in the above assertion of Professor Huxley's, we may find an issue into the clear upper air beyond the cloud of materialism.

Let us try to think what we mean by matter, or at any rate what we suppose ourselves to mean. When speaking above of the clock, and of the absence of any information in sensation itself as to the nature of its own cause, we observed that to most minds touch would seem to be an exception to the other senses, and to give an immediate perception of its cause. The reason is that impenetrability and matter seem almost convertible terms. But let us ask what we mean by impenetrability. If I thump the table at which I am writing, something resists me, and my fist can go no farther. If I push an oar through water, I feel the same thing in a less degree; but the water as a mass is certainly not impenetrable. If I wave my hands in the air, I experience a slight disturbance around them, though there is no sensible impediment to their movement. But of course, the property of impenetrability belongs to all three forms of matter alike. The only difference which we recognize, lies in the degree of possible flux or mobility characterizing the molecules in relation to one another. Thus the table is so compact that no part of it will perceptibly move

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out of the way to make room for my fist. But water and air are so constituted, that the parts which I push yield their place with more or less readiness to make room for me. And why do they move away? The property of impenetrability supplies the reason; because no two particles of matter can occupy the same place at the same time. In the mass all matter is penetrable; for the table, or for that matter solid stone, would yield to a sledge-hammer or a saw. But still no part of the hammer or saw would ever occupy the same space as any portion of wood or stone at the same moment of time. We shall get a better notion then of the one property generally regarded as essential to our hypothetical "matter," if we call that property, not impenetrability, but the exclusive occupation of space. Besides, the former term prematurely raises the question as to the nature of the difference between the plainly penetrable mass, and the supposed impenetrable molecule; while the exclusive occupation of space is a notion which we easily attach to all quantities of matter, great or small. Extension or occupation of space is in fact the only property which Descartes allowed to be essential to matter. And extension of course implies *exclusive* occupation; for if two portions of matter could be packed into space of the dimensions of one only, it is clear that one of them, or portions of each would occupy no space at all; that is, would lose the essential property of matter, or in other words, would be annihilated. While, there-

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fore, various kinds of matter may differ in shape, colour, weight, smell, taste and feeling, everything which can be regarded as matter at all, must occupy some space. Descartes went farther, and maintained that all space was occupied by matter of some kind, or in other words, that matter was infinitely extended. And it must be confessed that the progress of astronomical discovery has gone far to confirm his view. For, to say nothing of the revelations which more powerful telescopes have made of the unimagined vastness of the universe, the vibratory theory, which best explains the phenomena of light, and also the slow retardation in the movements of the heavenly bodies would certainly imply the existence of subtle ether diffused through space.

Assuming then that the one essential property of matter is its exclusive occupation of space, we have to choose between two alternative opinions, one or other of which is absolutely involved in the definition we have thus laid down. For matter must be either continuous and divisible beyond any conceivable limit, or it is atomic, that is, composed of indivisible particles with void spaces between them. The former view was ostensibly held by Descartes; but as, according to him, matter and space are inseparable if not identical, it is possible he may have anticipated more completely than we have thought the modern method of expressing idealism in the terms of materialism. The atomic theory is, I suppose, more generally held in our own

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day. Yet it is easy to show that as an explanation of the ultimate nature of the external world both views are equally untenable, inasmuch as they land us at once in absurdity. And the contradictions which ensue are quite sufficient to prove that we have made a mistake somewhere; most probably in the value we have assigned to matter. For instance, the familiar phenomena of expansion through heat and contraction through cold are quite inconsistent with any possible modification of Descartes' theory of the inseparability of matter and space. We must all agree that if a bar of iron is lengthened by heat to the extent of a quarter of an inch, it is not by the creation or generation of new iron for the purpose. Or if the bar be contracted to the same extent, it is still certain, on this theory, that every point of iron which had occupied a point of space before must occupy an equivalent point of space still. It is impossible therefore to avoid the inference that some indefinitely minute constituent portions of the iron must be driven off one from another, or compressed together in the act of expansion or contraction. Of course Descartes provides for this, by the influx or efflux of a subtler form of matter, which occupies or vacates the interstices of the iron according to the presence or absence of heat. But, to say nothing of the impossibility of allowing that on such a theory any differences of density or rarity can exist, it is clear that if heat be a mode of motion, as is now universally believed, the above explanation ceases

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to be an explanation at all. For the agitation of the particles in the iron must be communicated to the (so called) subtler matter which enters its pores. This matter also must be expanded by the heat; and then what is to fill the interstices which are thus occasioned? A still more subtle matter? But then the same objection would apply again, and so on *ad infinitum*. Farther, on this theory, according to which matter and space are inseparable, differences of density would be impossible; and if so, whatever value Descartes' magnificent cosmological dream may have for astronomers,—and for aught I know it may yet supersede the common notions of gravitation,—at any rate his notion of matter, unless it is capable of that spiritual interpretation above hinted at, is quite incongruous with the uses to which he puts it. For in a universe, such as he conceived, of continuous and infinitely extended matter, the only possible motion was vortical; because that is the only motion which does not require any point of matter to move out of the way of any other; and this, as every point of infinite space was already exclusively occupied, would of course have been impossible. But when he proceeds to evolve out of these vortical motions the complex movements and myriad forms of the actual world, he handles matter as an idea only, without any regard to the mechanical conditions he has laid down. For, to build up his world he requires three different kinds of material; one sort consisting of matter in its original state; a second

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formed of finer elements constituted by the attrition of the vortices, and finding their way to centres, where they are gathered into orbs of light or the candescent germs of planets; and a third kind arising out of the accretion of these finer elements into coarser particles, which, being thrown out to the surface of each fiery, revolving mass, are either dissipated, and return to their original state, as at the surface of the sun; or revolve in dark clouds which are hardened into a solid encasement, as in the planets. His endeavour to show how these different kinds of material would be ground out and assorted in the revolutions of his vortices is no doubt a wonderful effort of imagination; yet the very notion of particles, to say nothing of their finer division, or coarser accretion, is quite inconsistent with the continuity of matter. For particles imply division, and division means discontinuity. Again the degrees of tenuity or density, for which Descartes' theory provides by the pulverization or accretion of the vortical matter, are a contradiction to the fundamental assumption of the inseparable conjunction of matter and space. Take, for instance, his idea of the accretion by pressure of his most subtle and luminiferous particles. This either means that those particles were squeezed closer together so as to adhere; or it means nothing. But since they were already in actual contact, each point of space being occupied by a point of matter, the supposed process is simply inconceivable. The subtlest ether, if it is continuous, occupies the

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whole of the space in which it lies; that is, there is no point of the space which is not occupied by a point of matter. But the hardest iron or steel can do no more than this; and, therefore, on such a theory, it is impossible to give any account of its superior density.

The more favoured doctrine in modern times, however, accepts the other alternative mentioned above; and teaches that matter is ultimately constituted of minute indivisible particles, which are separated one from another by spaces immeasurably small, yet still definite and real. The attraction or repulsion of these atoms between themselves is supposed to explain the phenomena of chemical combination. Their agitation in their narrow orbits constitutes heat; the repulsion occasioned by this agitation explains expansion; and the same agitation, if sufficiently intense, may be communicated to the atoms of the ether, thus creating light. There is, of course, very much to be said for such a theory. In particular the doctrine of chemical equivalents, and the curious fact that when bodies unite in more than one proportion these proportions rise by exact multiples of the first, would certainly appear to point to the atomic theory in some form. But in what form? That is precisely the question at issue. When I find that Nitrogen being 14, the successive proportions of Oxygen which will unite with it are 8, 16, 24, 32 and 40, I confess it apparently goes far to justify my saying that one atom of Nitrogen may unite with one, two, three or more atoms of Oxygen.

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That is, there seems strong reason for believing that the force or forces represented by the name Oxygen must ultimately be distributed at a number of definite centres, which, as a matter of fact are never, so far as we know, disintegrated. But when molecular chemistry undertakes to say what those centres are, and assures me that they are hard little kernels of a substance fundamentally different from, and incommensurable with the life which is the only mode of being that I certainly and directly know, then I must beg leave to demur. I might do so on the ground that the physical philosopher is here asserting what he cannot possibly know—precisely the crime which he is always imputing to Theologians. But I go farther. I say he is asserting what is absurd, unthinkable, impossible.

For in the spaces between these ultimate atoms, there exists either some matter supposed to be more subtle than the atoms, or absolutely no matter at all. If the former alternative be taken, this is simply the continuity of matter over again. Every point of space is occupied by its own point of matter, which positively excludes any other from occupying the same space. The atmosphere in the interspaces therefore must be equally dense with the atoms which they surround, and the distinction between them disappears. But if there is absolutely no matter between the atoms, then all their effects, one upon another, must be exerted across a void—that is, through a medium of

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nothingness; or, in other words, the presence of force does not necessarily imply the presence of matter; and the only reason for assuming the latter as anything different from force is given up. The size of the interval makes no difference at all to the argument. Whether that interval be the 92-billionth of an inch, or the 92 million miles, or thereabouts, between the earth and the sun, if force can pass through, that is, can exist in, a space absolutely void of all matter; then the inseparability of matter and force is altogether given up. Yet the only reason for our belief in any matter different in substance from the subtle essence of our own consciousness is an inference from the presence of force, and from its apparent distribution at definite centres. Force, it is argued, must be exerted by something, and must act upon something. Very true; but if you infer from this that the presence of force implies always the presence of a sustaining material substance, the one essential quality of which is the exclusive occupation of space; then I say your own atomic theory contradicts you. I put before you the conception of two atoms; and I draw round each of them a circle. These circles touch at the middle point between the two; and I ask you what exists there? On the theory, you are bound to reply, nothing but force. If the atoms repel each other, their contrary forces meet here and struggle here. If the atoms attract each other, the attractive force of each meets here and lays hold of that of the other.



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Now, if force can exist here, at the tangential point of the two circles, without any matter at all in which it inheres, why is not the same thing possible at the centres as well?

It has been acknowledged that the atomic theory, in *some form*, is plainly suggested by the phenomena of chemical proportions. But at the same time, when this theory takes the materialistic shape which we have repudiated, it becomes manifestly inconsistent with the very phenomena which suggested it. For in this view, the only difference between a mixture such as air, and a compound such as carbonic acid or water, consists in a greater or less degree of contiguity between atoms which can never coalesce. Now, atoms ranged side by side, or in groups, must exert each its own independent force; and it seems inconceivable, that in this way two substances—like oxygen and hydrogen—could produce a third so utterly unlike both as water. While, if we might be allowed to think of our atoms as others think of the interspaces; that is, if we might be allowed to regard them as simply the elementary phenomena of force, the notion of any absolutely *exclusive* occupation of space is unnecessary. We may suppose these centres capable of wholly interpenetrating one another, and of thus producing an entirely new mode of force, or, in common language, a new substance.*

* There is a very curious and interesting letter on this subject by Prof. Faraday in the *Philosophical Magazine* for Feb. 1844.

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But I am very far from suggesting that we can find in mere force, as commonly understood, an adequate solution of the mystery of matter. For our notion of force seems to be engendered partly by our own sense of effort in muscular exertion; partly also by our imaginative treatment of the resistance which our efforts encounter in surrounding objects. We first of all impute to the external movements which resist or overcome us something like the "nisus" realized in ourselves; we then associate the idea with all observed sequences; and finally,—I am speaking of course, not of any individual experience, but of the genesis of the notion,—finding that the certainty and unfeeling regularity of these sequences appear to exclude the immediate action of will or conscious purpose, we abstract these, and there remains the really irrational conception of unliving effort, a nisus which involves no endeavour, a law which enforces itself. We shall never find the inmost shrine of existence in the presence of an idolon like this. I do not in the least deny the reality of force, any more than that of a substantial external world. But I maintain that both forces and forms, so far from lending themselves to "gross materialism," rather fascinate us with their shadowed hints of a mystery behind them both, far mightier than our will, and I will dare to add, more keenly living than our life.

Some of the threads which hang from many a ragged end of thought in the present essay we shall

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endeavour to take up hereafter. Meantime we have seen how that strange, keen evanescent spark of life which burns within can play as fantastic tricks with sordid surroundings as the gleam of a torch with the shadows of a cave. The soul is creative in very early days; and whatever it may gain from the outer world it returns a hundredfold in the dreams and affections and ideals which it projects. Objective circumstances there must be, to awaken the energies of the soul. But those circumstances, when association has endeared them, are no longer merely a blank array of mechanical forces. They are enriched and brightened, irradiated with many an eloquent suggestion of half-forgotten joys and sorrows, which are the result of experience, indeed, but an experience in which the elaborating and transforming powers of mind play far the largest part. But when the leaders of modern thought, tired of the bewilderment in which poetic sentiment and mystical imagination ended, abandoned all assumptions and set themselves to note precisely what could be seen and felt and heard, with a view to marking the connections between phenomena thus ascertained; it seemed to many that the days of mystery and romance were gone, and that the grand invariable order revealed must compel the dethronement of will and spirit and life beneath the apathetic rule of mechanical law. Yet increased powers of observation showed the hardest external facts to be merely a series of dissolving views. In geological

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perspective granite mountains melted into a fiery mist; to the astronomer's eye the steadfast order of the heavens became an unbeginning and endless evolution; and all the once inscrutable wonders of light and heat and organic life, followed up with eager determination, were lost in the infinitesimal vibrations of a molecular world. Is this the end? Do we not in the emotional, imaginative, and moral wealth of human life, get out of the universe immeasurably more than can be potentially contained in mere mechanical movement? Granting the formal correctness of every result, have we not to correct some fundamental error in the significance we assigned to the original terms of the problem? If self be living and not-self dead, we are brought to a dead lock. But if the life, in which we come to know ourselves and the world, embrace both self and not-self too; and if the ultimate elementary phenomena of nature be the simplest subjective forms through which the objective phase of Universal Energy is translated into our consciousness; it may be perfectly true that the reality of existence is inexpressible; but worship, spiritual aspiration, and that loyalty of soul to Infinite Power which is the true essence of faith, are still, and must be for ever, the noblest energies of man.

It is impossible to justify, as I hope to do hereafter, the view which I would venture to take of the bearing of these conclusions on the future of religion. If by substance we mean that which is and must be, then we

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know that life is; but we do not know that anything else is. And the phenomena of the physical world are at least conceivably explicable on the hypothesis of ultimate centres of energy; which centres may, for aught we know, be, to our consciousness, the elementary phenomenal definition of a universal spiritual Power. Life we know; Force we feel; nothing more. The notion of a dead substance is an idolon of sense, engendered by the resistance of phenomena to our will. For we cannot help feeling that immaterial angels,—if we may be allowed the conception,—or any forms of finite consciousness, if they were made by Infinite Power to move, or have the idea of moving, in definite paths,—say in straight lines or circles,—would inevitably think of the limiting forces about them, as solid walls shutting in their ways. And so, it may be that the physical laws which bound the efforts of our will engender in our minds the notion of a dead substance, foreign to, and incommensurable with, spiritual being. Farther, if this notion, when closely examined, turns out to be not only incapable of proof, but self-contradictory and absurd, I am not much troubled by the impossibility of propounding, at present, on the basis of a spiritual substance, any comprehensive and entirely adequate theory of the universe. Nor do I share the sublime indifference of "know-nothings" in philosophy, for whom the end of inquiry is the demonstration of ignorance, and who, like the disagreeable operative in "Hard Times," are perpetually remarking

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